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URANIUM-235 IN "TUKHOLITE"

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The radioactive mineral "tukholite," which is encountered among Ontario pegmatites, contains, together with uranium and thorium, a considerable amount of carbon. Minerals that contain carbon obviously possess a volcanic origin. One can assume that if tukholite comes from a mass of sufficient size, in which the carbon has acted as amoderator for neutron fission, then a chain reaction could have taken place in it during some time in its past. Thus the uranium contained in tukholite must differ from ordinary uranium in percentage content of U-235.

For the purpose of chemical analysis, some tukholite samples were ground up and roasted (calcined); whereupon the losses, including carbon and volatile admixtures, were found to be 26.5 percent. Further analysis on the carbon showed its quantity to be 21 percent. The amount of U_3O_8 obtained from tukholite and a control sample of ordinary uranium were deposited in layers (2 milligrams/square centimeter) on aluminum foil. The alpha particles from disintegrating uranium atoms and fission products were recorded with the aid of an air counter. The foil containing the control uranium showed an intensity, according to the readings, 10 percent greater than the uranium from tukholite. The fission of uranium was caused by neutrons from the usual Ra-Be source (one millicurie); the neutrons were slowed down in a paraffin block.

Similar experiments were conducted with the aid of ionization chambers, inside of which were placed samples of the foil containing U_3O_8. The reading intensity of alpha particles for the control sample was 92,000 per minute, and for the uranium from tukholite it was 84,000 per minute. The neutron source and paraffin were placed outside the chamber. To record the intensity of fission products, a pulse discriminator was utilized. The results of the tests are shown in the following table:

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STATE	X	NAVY	X	NSRB		DISTRIBUTION						
ARMY	X	AIR	X	FBI		aec X						

	Air Counter of Pulses (pulse/min)	Ionization Chamber (pulse/min)
Control U	0.52 ± 0.123	0.44 ± 0.07
U from Tukholite	0.18 ± 0.08	0.19 ± 0.05

The difference in uranium content could not be greater than 1 percent, while the alpha intensity of the control sample was greater by 10 percent. This difference can be explained by the supplementary alpha emitters of the control sample or admixtures in the tukholite U_3O_8, which (emitters) trap alpha particles. The admixtures, by lowering the alpha activity by 10 percent, are insufficient to explain such a small number of pulses from the fission of tukholite uranium. Thus the results of the tests are in agreement with the assumption concerning the smaller percentage content of U-235.

J. K. Orr, et al. (Phys Rev, 76, No 1, 155, 1949) reported briefly merely the factual side, without reaching the conclusions that should follow if further works confirm present results. Actually, if at a certain moment in the earth's crust a chain reaction had occurred, then the energy released could have caused a scattering or splattering of the mass in which the chain reaction took place and a concomitant formation of ore veins with dissemination of uranium.

In connection with this, it is necessary to note that already in 1939 Academician V. I. Vernadskiy had proposed an explanation of the volcanic activity of the earth by the release of atomic energy. Such a process on the basis of chain reaction can occur even discontinuously by alternately dying out and flaring up, depending upon the displacement of the earth's strata, the accumulation and decay of the reaction products, and the temperature variation in its process. As is known, many foci of volcanic activity on the earth's surface have outcrops of radioactive sources.

It should be noted that we are now encountering the first case of a difference in isotopic composition of elements under terrestrial conditions.

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